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TWO NEW SPECIES OF *HELMINTHOGLYPTA* (MOLLUSCA: PULMONATA) FROM SAN DIEGO COUNTY, CALIFORNIA

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ABSTRACT: Two new species of land snails of the genus *Helminthoglypta* are described from San Diego County, California.

During the past several years there has been an accumulation of material from southern California representing several unnamed species of land snails of the genus *Helminthoglypta*. These have usually been from isolated localities, with inadequate material for anatomical study or even for a thorough study of the shell.

In the case of two such unnamed species from localities in San Diego County, we have finally accumulated a number of specimens sufficient for complete description of shell morphology and anatomy, as well as for significant comparison with other apparently related populations.

The earliest collection from one of these populations was made on 24 October 1946 by the late H. Arden Edwards, founder of the Antelope Valley Museum and former staff artist of the Southwest Museum. The second population was discovered a few miles away, on 28 March 1947, by one of us (WOG) and the late Munroe L. Walton, well-known amateur malacologist. Since then, additional collections have been made in 1953, 1954, 1957, 1959, 1961, 1963, 1970, and most recently, on 9 January 1975 by one of us (WBM) and Carl C. Christensen and Richard L. Reeder, University of Arizona graduate student malacologists. The latest collection confirmed that both populations are surviving, although the populations are subjected to pressures from encroaching human habitation, heavy recreational use, and economic

management (clearing and gathering of fallen trees for firewood).

The two populations are considered to represent two very closely related but distinct species, isolated from each other not only geographically but also ecologically and, apparently, physiologically. They are described below. All measurements of shell and anatomical structures are given in millimeters.

FAMILY HELMINTHOGLYPTIDAE

Helminthoglypta waltoni, new species

Figures 1 and 3

Diagnosis.—A species of medium size, heavily papillose sculpture, and small umbilicus, characterized anatomically by a long, club-shaped, double-tubed penis, abutting distally on a short, saccular, thin-walled, hourglass-shaped preputial chamber.

Description of Holotype.—Shell helicoid, low-conic, of medium size for the genus; whorls five and one-third, convex, gradually increasing to the last whorl which is moderately expanded and descends to the aperture so that the suture lies at an angle of about 45 degrees with the axis of the shell; base rounded,

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the umbilicus contained about ten times in the greater diameter of the shell. Aperture oblique, subcircular; peristome slightly expanded and slightly thickened within, the columellar end moderately reflected over the margin of the umbilicus. A faint parietal callus connects the ends of the peristome.

Embryonic shell consists of one and one-third whorl; except on the worn embryonic shell and early neanic whorls, which are indistinctly granulose, the entire shell is heavily papillose, the papillae arranged in forwardly descending series, while under high magnification the surface between the papillae is finely wrinkly-granulose. On both upper and basal aspects of the shell, the papillae are closely spaced on the first half of the body whorl and somewhat widely spaced on the beginning of the second half of the body whorl, becoming more closely spaced behind the aperture. In addition, all whorls are conspicuously marked, both above and below, by numerous, closely spaced lines of growth.

Color light Prout's brown (Ridgway Color Standards) above and over the periphery, while the under surface is somewhat lighter in color than the upper part of the shell. Just above the periphery is a chestnut-brown band about one mm in width on the body whorl and on the last half of the penultimate whorl just above the lower suture. This band is bordered above and below by somewhat narrower bands lighter in color than the general color of the shell.

Holotype measurements: maximum diameter 23.2, minimum diameter 19.7, height 15.3, umbilicus diameter 2.3.

Anatomy.—The mantle is whitish with irregular, black pigment spots. The penis is moderately long, the epiphallus about equal in length to the penis, and the epiphallic caecum slightly longer. The penis is club-shaped, with the distal end narrow, and widening evenly toward the proximal end which narrows abruptly at its juncture with the epiphallus. In the cleared whole-mount of the genitalia, the double tube structure which is characteristic of the genus is evident; the outer wall is thick. Distal end of penis consists of a thin walled, short, saccular preputial chamber with a narrow constriction about halfway along its length, resembling an hourglass. Dart sac rather large. Spindle-shaped mucus glands attach directly to a common duct which is somewhat shorter than the dart sac. Vagina attached to the distal end of the atrium near the attachment of the penis. Lengths of reproductive structures: penis 15.4, epiphallus 15.1, epiphallic caecum 18.1, vagina 3.8, free oviduct 6.7, spermathecal duct 39.3, spermathecal diverticulum 28.0 arising 23.2 from the base of the spermathecal duct, atrial sac 7.8, dart sac 1.9 by 2.3, mucus glands 3.7, common duct of the mucus glands 0.9, spermatheca 3.3 by 5.9.

Type Locality.—Laguna Mountains, San Diego Co., California, in rockslide in small ravine on east side of Scove Canyon road (as shown on 1960 Mount Laguna topographic map, 7.5 minute series) at a point 0.8 road miles from the junction of the Laguna Mountain

highway (Sunrise Highway) with the southern end of Scove Canyon road; this locality is at Lat. 32° 50.3' N. and Long. 116° 29.3' W. Elevation about 4500 feet. Collectors M. L. Walton and W. O. Gregg, 28 March 1947.

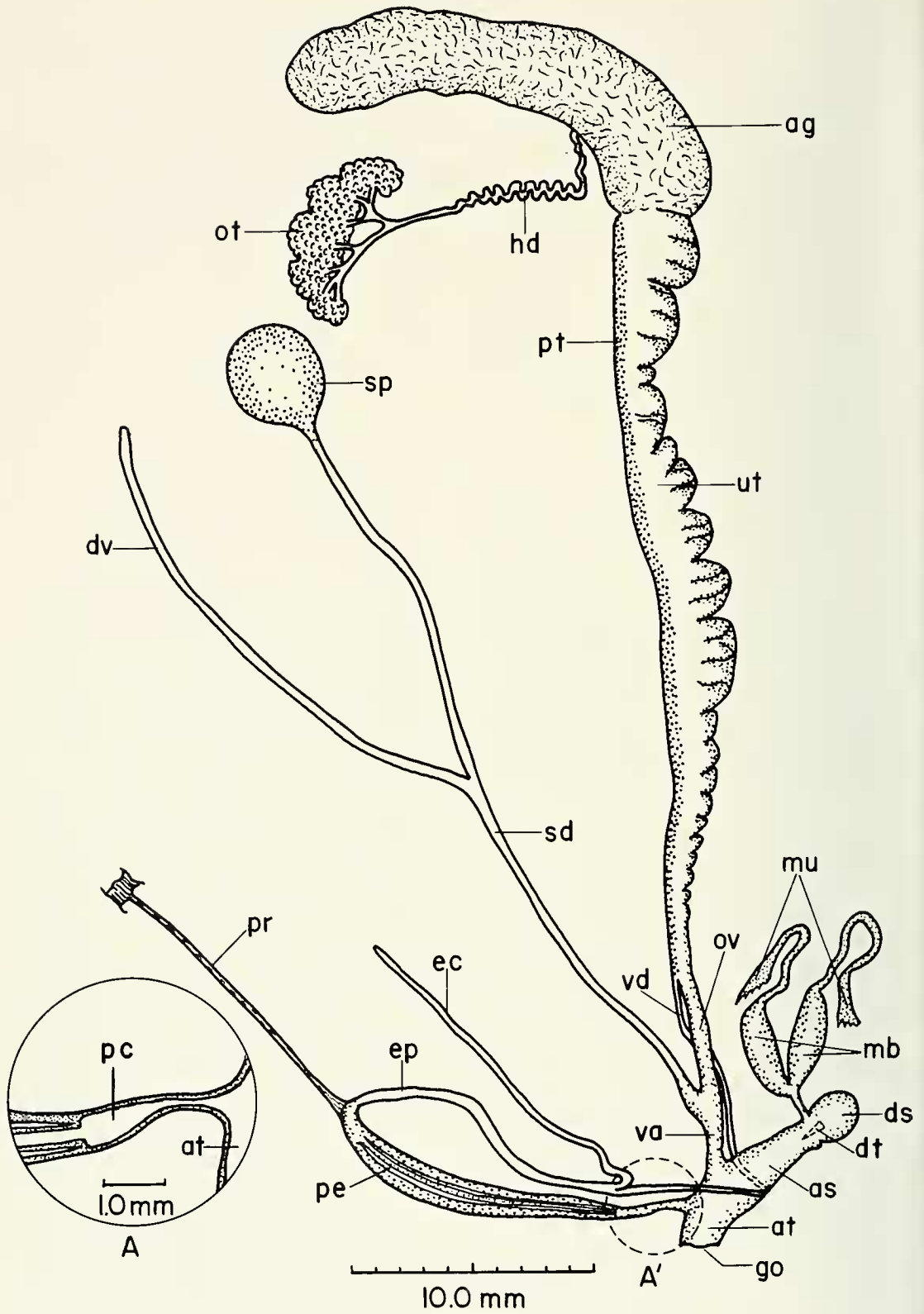
Type Material.—Holotype, Natural History Museum of Los Angeles County No. 1760. Paratypes: Natural History Museum of Los Angeles County No. 1107, Delaware Museum of Natural History (ex- M. L. Walton collection No. 6621), and private collections of S. S. Berry 19,909, W. B. Miller 2597, 4258, 4427, 6482, 6486 (ex- W. O. Gregg 3710), 6487 (ex-WOG 6292), 6488 (ex-WOG 7111), and 6489 (ex-WOG 7793), C. C. Christensen 3380, and R. L. Reeder 325.

Remarks.—In view of the fact that specimens were always scarce and found only at the type locality, many collections were made in order to obtain sufficient paratype material for adequate study. In unworn, young paratypes, the embryonic and early neanic whorls are wrinkly-granulose. The papillae first appear on the second half of the first embryonic whorl where they are widely spaced at first, becoming closely spaced on the second half of the second neanic whorl. In unworn, newly formed parts of the shell, the papillae are tipped with fine, hair-like periostracal processes. The processes, completely worn off in the holotype, are particularly conspicuous in young specimens.

Specimens killed on 28 March 1947 contained red, thread-like spermatophores. In one specimen, through the semitransparent walls of the spermathecal duct and diverticulum, fragments of spermatophores were seen, end to end as one continuous mass, from the base of the spermathecal duct well up into the diverticulum. In all specimens, the spermathecas were filled with small fragments of spermatophores, but the sections of spermathecal ducts between the diverticula and the spermathecas were empty.

The shell of *Helminthoglypta waltoni* most closely resembles that of *Helminthoglypta lowei* (Bartsch, 1918) in size, shape, and sculpture, although in the latter the papillae are less closely spaced than in *H. waltoni*. The anatomy of *H. waltoni*, however, shows it to be most closely related to *Helminthoglypta thermimontis* S. S. Berry, 1953, characterized by the same club-shaped penis and the small, hourglass-shaped preputial chamber (eversion chamber) described for *H. waltoni*. The shell of *H. waltoni* differs from that of *H. thermimontis* by its smaller umbilicus and the finer, less dense papillation of the body whorl.

The anatomy of *H. lowei* is entirely different from that of *H. waltoni* and *H. thermimontis* in that it has a large, saccular, sausage-shaped



preputial (eversion) chamber. This type of penial anatomy has been noted in other populations of snails in and around the Cuyamaca Mountains and was figured by Pilsbry (Land Mollusca of North America (north of Mexico), Acad. Nat. Sci. Philadelphia, Monograph 3, vol. 1 (1):146, fig. 73, 1939) as "genitalia of a *Helminthoglypta* of uncertain status."

This species is named for the late Munroe L. Walton, good friend and companion on countless field trips with both of us.

Helminthoglypta edwardsi, new species

Figures 2 and 3

Diagnosis.—A species of small size, heavily papillose sculpture, and small umbilicus, characterized anatomically by a long, club-shaped, double-tubed penis, abutting distally on a short, saccular, thin-walled, hourglass-shaped preputial chamber.

Description of Holotype.—Shell helicoid, flatly conic, moderately small for the genus, whorls four and three-fourths, convex, gradually increasing to the body whorl which is moderately expanded; the last quarter of the body whorl descends moderately to the aperture, with the suture lying at a 45 degree angle with the axis of the shell. Base rounded; umbilicus small, contained about ten times in the maximum diameter of the shell and one-third covered by the reflected inner lip. Aperture subcircular, oblique; basal portion of the peristome slightly reflected and slightly thickened within, while the columellar end is broadly reflected over a third of the umbilicus. A faint suggestion of parietal callus connects the ends of the peristome.

The embryonic shell consists of one and two-thirds whorl; early portion of first whorl marked with radial wrinkle-like striae, the remainder of the embryonic shell uniformly wrinkly-granulose with widely spaced, elongate papillae superimposed. These papillae, starting on the second half of the first whorl and somewhat indistinct on the worn apex of the holotype, appear in spiral and oblique series. The papillae become more closely spaced on the last third of the first neanic whorl and thus continue over the remainder of the shell, varying from elongate to evenly rounded on different parts of the shell. The underlying granulation is distinct on the penultimate and early whorls but indistinct on the body whorl. The base of the shell is

uniformly papillose. Incremental striae are prominent on the body whorl. On unworn newly formed portions of the shell the papillae bear minute, hair-like periortral processes.

Color light cinnamon-brown over the upper and peripheral aspects of the shell, lighter in color on the under surface. Above the periphery is a chestnut-brown band about one mm in width. It is bordered below by a band about the same width and somewhat lighter in color than the body of the shell, and above by a somewhat narrower light band.

Holotype measurements: maximum diameter 17.7, minimum diameter 15.9, height 11.1, umbilicus diameter 1.8.

Anatomy.—The mantle is marked with black pigment spots of varied shapes and sizes. The genitalia are similar to those of *H. waltoni*, with the spermathecal diverticulum and portion of the spermathecal duct proximal to the attachment of the duct proportionately shorter in *edwardsi*. Lengths of reproductive structures: penis 10.7, epiphallus 10.6, epiphallic caecum 13.2, vagina 1.7, free oviduct 4.2, spermathecal duct 27.3, spermathecal diverticulum 20.1 arising 12.0 from the base of the duct, spermatheca 2.0 by 2.4, atrial sac 4.5, dart sac 1.7 by 2.0, mucus glands 3.1, common duct of the mucus glands 0.8.

Type Locality.—Pine Valley, San Diego Co. California, along Manzanita Trail near Manzanita Creek, at Lat. 32° 49.7' N. and Long. 116° 31.1' W. Elevation about 3700 feet. Collector W. O. Gregg, 18 January 1953.

Type Material.—Holotype, Natural History Museum of Los Angeles County No. 1761. Paratypes: Natural History Museum of Los Angeles County No. 1108, Delaware Museum of Natural History (ex- M. L. Walton collection No. 6622), and private collections of S. S. Berry 19,910 and W. B. Miller 2609, 4257, 6490 (ex-WOG 3642), 6491 (ex-WOG 3698), 6492 (ex-WOG 3718), 6493 (ex-WOG 6293), and 6494 (ex-WOG 7112).

Additional Localities.—H. Arden Edwards reported finding this snail in various localities in Pine Valley, northeast of U.S. Highway 80, within a radius of one mile from the Pine Valley Post Office. Also near highway 80 along La Posta Creek (H. A. Edwards, 28 March 1947): along Pine Valley Creek and Pine Creek Road at 2.0 road miles N. of highway 80 (W. B. Miller, 4 June 1970): and along Pine Valley Creek and Pine Creek Road at 2.1 road miles N. of highway 80 (R. L. Reeder, 9 Jan. 1975).

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Figure 1. *Helminthoglypta waltoni*, new species. Genitalia; drawing made from projection of stained whole mount. Distal portion of penis A' magnified in inset A to show details in sagittal section. ag, albumin gland; as, atrial sac; at, atrium; ds, dart sac; dt, dart; dv, spermathecal diverticulum; ec, epiphallic caecum; ep, epiphallus; go, genital orifice; hd, hermaphroditic duct; mb, mucus bulbs; mu, mucus gland membranes; ot, ovotestis; ov, oviduct; pc, preputial chamber; pe, penis; pr, penial retractor; pt, prostate; sd, spermathecal duct; sp, spermatheca; ut, uterus; va, vagina; vd, vas deferens.

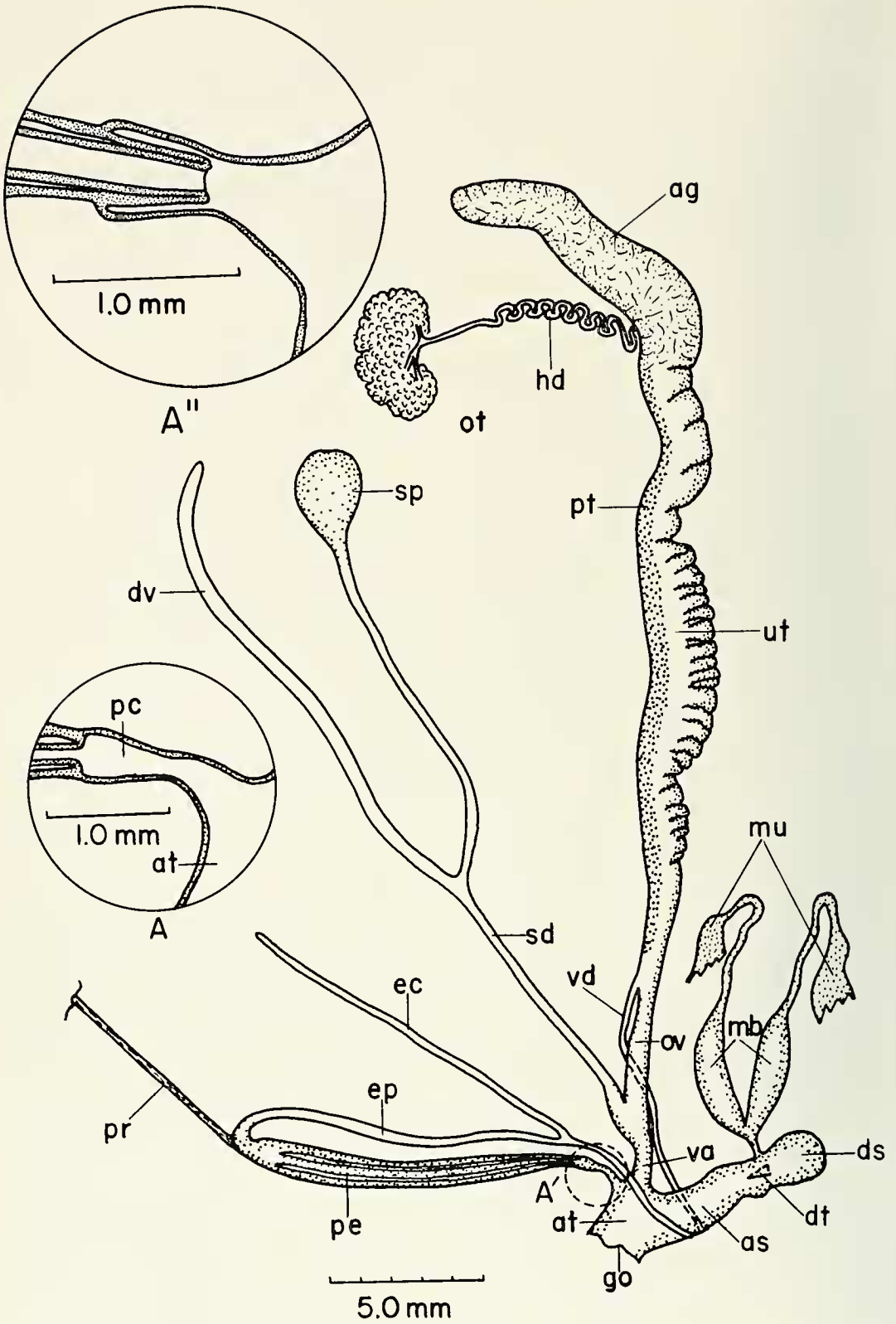




Figure 3. A-C, *Helminthoglypta waltoni* new species; Lower figures: *Helminthoglypta edwardsi* new species.

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Figure 2. *Helminthoglypta edwardsi*, new species. Genitalia; drawing made from projection of stained whole mount. Distal portion of penis A' magnified in inset A to show details in sagittal section. A", sagittal section of another specimen showing partially everted penis in preputial chamber. Abbreviations same as those defined in figure 1.

Remarks.—As in the case of *H. waltoni*, specimens have always been scarce and are becoming scarcer. The type locality has been subdivided for development and is largely built up with homes. Fortunately, this snail can be found well up along Pine Valley Creek to the north wherever fallen logs can provide a suitable habitat.

Helminthoglypta edwardsi is most closely related to *H. waltoni*, differing from the latter by its less elevated, smaller shell with more closely coiled whorls, by the more widely reflected inner lip, more regularly and closely spaced papillation, and more delicate incremental striation. Anatomically, it is nearly identical to *H. waltoni*, differing from the latter by the proportionately shorter spermathecal diverticulum and portion of the spermathecal duct proximal to the attachment of the diverticulum.

In view of the fact that *H. thermimontis*, *H. waltoni*, and *H. edwardsi* have closely similar anatomies, it became necessary to decide, in our opinion, whether all three might be conspecific. *Helminthoglypta thermimontis* is a log snail living at high elevations above 5000 feet on Hot Springs

Mountain (we have found it at 6100 ft) while *H. edwardsi* is a log snail living at lower elevations along Pine Valley Creek, some 35 miles south of Hot Springs Mountain, and *H. waltoni* is a rock-slide inhabitant. Repeated attempts to raise *H. waltoni* in a wooden terrarium have failed, even though *H. edwardsi* has thrived in a similar terrarium; this led us to believe that *H. waltoni* has different ecological and physiological adaptations than *H. edwardsi*. Thus, in attempting to infer reproductive isolation from morphological, anatomical, ecological, and physiological differences, we concluded that it appears highly improbable that any hybrid populations (even if hybrids could be obtained) would be able to survive in any one of the three niches of the parent populations. Accordingly, *H. waltoni* and *H. edwardsi* are considered closely related but distinct species. Both are also closely related to *H. thermimontis* and all three are probably derived from an immediate common ancestor.

Helminthoglypta edwardsi is named for the late H. Arden Edwards who first brought this snail to the attention of one of us (WOG).

SOME NEPHTYIDAE (POLYCHAETA) FROM UBATUBA, BRASIL

KRISTIAN FAUCHALD¹

ABSTRACT: Four species of nephtyid polychaetes are reported from Ubatuba, Brasil. The description of *Aglaophamus juvenalis* (Kinberg, 1866) is amplified and illustrations of median parapodia are given for all four species.

Nephtyids from Brasil have previously been reported by Kinberg (1866, p. 240; Hartman, 1948, p. 51) and Nonato and Luna (1970, p. 71). The present collection was sent to the author for identification by Edmundo Nonato of Instituto Oceanografico de Universidade de Sao Paulo. It contains four species from intertidal and shallow subtidal areas.

Station list:

A-144: Station pier, Ubatuba, under stones in black, sand mud.

A-255: Praia Dura, Ubatuba, intertidal in fine sand.

A-322: Anchieta Island, 10 m, gray, fine mud.

B-9 : Cananeia, 4 m, soft mud with organic debris.

B-63 : Cananeia, 6 m, soft mud with organic debris.

Aglaophamus juvenalis (Kinberg, 1866)
(Fig. 1a-c)

Aglaophame juvenalis Kinberg, 1866, p. 240
Aglaophamus juvenalis, Hartman, 1948, pp. 51-52

Aglaophamus juvenalis has remained known through its original record from Rio de Janeiro only.

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